REMARKS

Reconsideration of the present application is respectfully requested.

In the first Office Action the Examiner rejected claims 1-18, 20-21,42-52, 54, 55, 57-63, 65-66, 68-71, and 73-81 under 35 U.S.C. §102(b) as anticipated by Katsurabayashi or, in the alternative, under 35 U.S.C. §103(a) as obvious over Katsurabayashi, and rejected claims 25-35, 37-38, and 40-41 under 35 U.S.C. §103(a) as obvious over Katsurabayashi in view of McArdle. The Examiner also rejected claims 5 and 25 on grounds of alleged double patenting. The Examiner allowed claims 19, 22-24, 36, 39, 53, 56, 64, 67 and 72.

Claims 1-5, 25, 42, 51, 57, 68 and 75 are hereby amended, as discussed below, and new claims 82-89 are hereby added to the application.

Claim Rejections – 35 U.S.C. §102(b)/103(a)

Claim 1

Claim 1 is hereby amended to recite a work area with a moderator layer, a participant layer and a composite thereof on a moderator workstation and on a plurality of participant workstations, wherein each participant's moderator layer is dedicated to input from the moderator's moderator layer. Claim 1 further recites that the moderator workstation is programmed to obtain an object from a selected participant's participant layer and include the object in the moderator work area, and further programmed to cause the object to be forwarded to the other participants.

It is respectfully submitted that Katsurabayashi does not teach or suggest the claimed combination, including in particular a layer on each participant workstation that is dedicated to input from the moderator layer on the moderator's workstation, combined with forwarding of objects at the direction of the moderator, e.g., in a preferred embodiment, sending objects from participants to a server and therefrom to the moderator, and then forwarding those objects from the server to other participants. Katsurabayashi describes each personal computer (PC) sending data directly to the other PCs. See, e.g., col. 6, lines 14-21, and col. 7, lines 14-16. The process puts a substantial load on each PC, making it necessary to provide more powerful PCs for all

users than are desired to handle communications in the system. Applicants have discovered that it is more effective to route communications at the direction of the moderator, using a higher-power machine or machines as a server in a preferred embodiment.

Claims 2-4

Claims 2-4 are directed toward layered drawing surfaces and an advantageous mechanism for erasing one's own work without erasing background images or closely adjacent work of others on the drawing surface. Claims 2 and 4 are amended consistent with changes made to claim 1 from which they depend.

Each user has a drawing surface with three layers – a moderator layer, a participant layer and a background layer – which are combined to form a main layer or composite display layer, i.e., the image actually displayed, as explained in the specification with reference to FIGS. 10A and 10B. The display layer typically contains the complete bit-mapped image that is sent to the computer display at a predetermined refresh rate. The display layer is also the drawing surface, e.g., the input layer for a tablet PC or other pen-enabled computer, and it often includes images, sometime overlapping, from different sources such as a teacher and a student in an interactive learning environment.

In a system having the ability to erase work on a conventional shared drawing surface, an erasure by one user would erase all objects in the area covered by the eraser, including any objects in that area that were added by other users as well as background objects In contrast, according to the invention of claims 2-4, a user can erase his own work without disturbing the work of others, without disturbing the background, and without the need to create a complete new composite bit map for the entire frame.

For example, according to claim 4, if a moderator erases a spot on the drawing surface of his workstation, the corresponding portion of the *moderator* layer of each work area is replaced with the corresponding portion of the *background* layer, and the corresponding portion of the *main* layer is replaced with the corresponding portion of the *participant* layer. The process is shown in steps in the attached drawings as a more specific example in which a moderator has previously drawn a square 1 and a participant A (Ann) has drawn a circle 2 (step 1). The

drawings illustrate the layers on Ann's workstation, with the display (main) layer on the left and the offscreen layers on the right.

The moderator (on his own workstation) places an erase object over a part of the square that includes the circle and is identified by reference numeral 3 on Ann's main layer (step 2). The corresponding portion 4 of Ann's participant layer is copied to her main layer (step 3), and the corresponding portion 5 of her background layer is copied to her moderator layer (step 4).[1] Thus, the moderator erases a spot and the corresponding spot is erased on the moderator layer of the drawing surface on Ann's workstation, but Ann's participant layer is unaffected, and she continues to see her work and the background image or images on her display, without a complete reconstruction of a composite display layer.

Erasures by the moderator cause similar copy operations to occur on the layers of the moderator's work area, as depicted in FIG. 11A and described with reference thereto in the specification. Likewise, FIG. 11B depicts an example of the copy-erasure algorithm according to the embodiment of claim 2.

It is respectfully submitted that Katsurabayashi does not teach or suggest erasure functionality such as claimed in claims 2-4. The claimed invention does not merely undisplay a layer as in Katsurabayashi, which presumably requires a complete new composite for the frame to be displayed after a change of display state.[2] Further, although Katsurabayashi discloses integrated layers, which include all objects from selected plural layers, it does not teach or suggest any way for a user to, for example, erase part of one object on an integrated layer without erasing an overlapping part of an object from another user.

It is respectfully submitted that neither Katsurabayashi nor the prior art as a whole teaches or suggests a network as claimed in which images created by a participant may be erased from the participant's display while maintaining the display of images from the moderator and background, or in which images created by the moderator may be erased from the moderator's display while maintaining the display of images from a participant as well as the background images, without requiring a complete refresh of the frame buffer for the display. Claims 2-4 are believed to be allowable for these reasons in addition to those applicable to claim 1.

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[1] Not necessarily in this order.

[2] The layers are displayed one over another. Col. 12, lines 18-20.

Claim 5

Claim 5 is directed toward a network employing client/server architecture for knowledge transfer in a group setting, and is hereby amended to clarify its intended scope.

Applicants' early attempts at implementing a system for knowledge transfer in a group setting relied on a typical and simple peer-to-peer network communication strategy. Such a network does not have a server to mediate communication. The moderator workstation would directly transfer information to each participant workstation in sequence. For example, in an interactive classroom instruction system, suppose the teacher drew an ink stroke while five students were using the system. The teacher workstation would enter a loop that would iteratively transfer the ink stroke directly to student one, then would transfer the stroke directly to student two, then to student three, and so on until the stroke had been transferred to student five.

Initial testing of this early version of the system was successful when small numbers of students used the system at the same time. However, as larger-scale testing progressed and the number of concurrent participants grew, Applicants were surprised by several unexpected manifestations of performance degradation. First, some students reported that they would receive data from the teacher later than other students who might be sitting nearby. Second, the teacher began to report that his workstation became increasingly sluggish as more students joined the session. Third, when a student came to class late, as is not uncommon, the teacher's workstation would behave sluggishly after the student joined the electronic class session and the other students in the class would report a lag in receiving objects from the instructor.

Investigation led Applicants to understand that these three problems were directly related. As the number of students grew, the processor on the teacher workstation was spending an increasing percentage of its time iterating through the list of students each time an object needed to be transferred to each student. This made the processor unavailable to handle other processing requests from the teacher such as updating the display in response to mouse or pen movements and the like. Similarly, the time differential between when the first student received a data object and when the final student received that same object increased as the number of students grew. Similarly, when a student joined the electronic class session late, the teacher workstation had to send that student the backlog of objects that the student had missed. It was not unusual for this backlog to include hundreds or even thousands of objects. Because the teacher workstation was

busy sending this backlog of objects it would respond sluggishly to actions from the teacher and would also lose its capacity to quickly send new objects to the other students in the class.

It was particularly surprising that the problems described in the previous paragraph began to manifest themselves with as few as twenty or thirty student users. In hindsight, Applicants realize that this was partially due to the fact that the teacher workstation had to transfer complex objects including graphical objects. Additionally, the problems encountered were exacerbated by the fact that the teacher workstation generally employed a standard desktop or laptop computer. For reasons of economy, such computers typically have fairly limited power in terms of, for example, processing speed and internal memory, and this was especially so with the computers that were cost-effective and otherwise practical for use in an electronic classroom at the time the present invention was made. The client/server architecture in the invention of claim 5 has allowed a substantial improvement in performance with continued use of relatively inexpensive client computers for the moderator workstation.

Katsurabayashi does not mention the word "server," does not show a server, and does not in any way suggest the desirability of a client/server architecture to one of ordinary skill in the art. Katsurabayashi teaches a peer-to-peer network. Note in this regard that FIG. 2 shows a simple line 1 interconnecting "[p]lural personal computers, e.g., four personal computers 2A, 2B, 2C and 2D,"[3] as is conventional for depiction of a peer-to-peer network. The shared data memory 14, individual data memory 15, and data manager 16 described in column 9 are all in every PC, as can be appreciated from FIG. 1 and the description thereof.

While it may seem obvious in hindsight to do what Applicants have done, the Examiner understands that hindsight is not the measure of patentability. It is respectively submitted that, at the time the present invention was made, the combination of features recited in claim 5 was not obvious to one of ordinary skill in the art in view of Katsurabayashi or the prior art as a whole.

Claim 42

Claim 42 is broadened in certain respects by this amendment, and it is directed toward a network of computers programmed for knowledge transfer in a group setting, the network comprising a moderator workstation and participant workstations which are each adapted to

[3] Col. 6, lines 2-3.

create a composite of a moderator layer, a participant layer, and a background layer which contains one or more objects. The moderator layer on each participant workstation in the claimed network is common to the moderator's work area and dedicated to input from the moderator's moderator layer.

The Examiner refers to an "un-display layer" in Katsurabayashi which he considers a background layer, but claim 42 as amended clarifies that the background layer contains objects and is not merely an undisplayed layer. The objects on the background layer may be termed "permanent" objects due to their relative significance in particular applications, such as a musical staff on a shared drawing surface used as a sheet of music in a music theory class, or the X-Y axes of a graph for a drawing surface in a math class.

It is respectfully submitted that Katsurabayashi does not teach or suggest such an object-bearing background layer in combination with a layer for the participant on each of a plurality of participant workstations which also include a layer dedicated to input from the moderator layer on the moderator workstation, which also creates a composite of the moderator layer, a layer for a participant, and an object-bearing background layer.

Claim 57

Claim 57 is broadened in certain respects and is now directed toward a network having erasure functionality similar to that recited in claim 4, with multiple copy operations performed on the moderator's work area as described in the specification with reference to FIG. 11A. The claimed erasure functionality allows the moderator to erase his own work on a shared drawing surface without erasing other images and without a complete reconstruction of a composite display layer. Amended claim 57 is believed to be allowable for this reason among others, including reasons similar to those stated above with respect to claim 4.

Claim 75

Claim 75 is amended to cover a method of facilitating knowledge transfer in a group setting. The method comprises the use of client/server architecture with moderator and participant workstations as defined in the claim. According to the claimed method, a moderator

sends data structures from his workstation to a database on a server and therefrom to the participant workstations for display on the participant display devices, and participants send data structures from their workstations to the database on the server and therefrom to the moderator workstation.

As discussed above with respect to claim 5, Katsurabayashi teaches a peer-to-peer network. Katsurabayashi does not mention the word "server," does not show a server, and does not in any way suggest the desirability of using client/server architecture to one of ordinary skill in the art. It is respectively submitted that, at the time the present invention was made, it was not obvious to one of ordinary skill in the art, in view of Katsurabayashi or the prior art as a whole, to use client/server architecture in a method as defined in claim 75.

Claim Rejections – 35 U.S.C. §103(a)

Claim 25

Claim 25, rejected over Katsurabayashi on grounds of obviousness, is hereby amended and is believed to be allowable over the cited reference because Katsurabayashi does not teach or suggest a layered drawing surface comprising a moderator layer, a participant layer, and a composite thereof in a network of the type claimed, wherein there is a dedicated layer on each participant workstation for input from a moderator, and wherein a moderator workstation is programmed to include objects from different participant's participant layers in the moderator's participant layer.

Katsurabayashi appears to disclose different layers for different proposers, whereas, in the invention of amended claim 25, the moderator work area has a participant layer for input from more than one participant.

Allowable Subject Matter

Claim 68

Claim 68 is hereby amended to include collision-avoidance functionality identified by the Examiner as allowable subject matter, e.g., in allowed claim 67, and amended claim 68 should accordingly be allowed on that basis.

New Claims

Claim 82

Claim 82 is believed to be allowable for the reasons stated above with respect to claim 25 from which it depends, and also because there is no apparent teaching or suggestion in the prior art of a network of the type claimed in which the moderator work area on the moderator's workstation has a *single participant layer* for objects received from the plurality of participant work areas.

Claim 83

Claim 83 depends upon claim 57 and adds the further limitation of erasure functionality on participant workstations, involving multiple copy operations as described in the specification with reference to FIG. 11B. The claimed erasure functionality allows images created by the participant to be erased from the display while maintaining the display of both background images and images from the moderator. New claim 83 is believed to be allowable for this reason in addition to the reasons applicable to claim 57 from which it depends.

Claims 84 and 85

Claim 84 is a method claim similar in scope to claim 75 but directed toward interactive learning involving a teacher and students. Like claim 75, the new claim recites the use of

client/server architecture in the claimed method. While such architecture was certainly known in general at the time the present invention was made, it is respectfully submitted that it was not obvious at the time – to one of ordinary skill in the art – either in view of Katsurabayashi or the prior art as a whole, to use client/server architecture in a classroom application of a method of the type claimed.

Claim 85 is believed to be allowable for the reasons applicable to claim 84 from which it depends, and further because of the added limitation of each virtual drawing surface comprising a teacher layer, a student input layer, and a background layer containing at least one object.

Claims 86-89

New claim 86 is a method claim directed toward the use of a moderator layer, a participant layer, and a background layer containing at least one object in the moderator work area of the moderator workstation, the three layers being combined for display. The claimed method also involves the use, on participant workstations, of a participant layer, a moderator layer common to the moderator's work area and dedicated to input from the moderator layer of the moderator's work area, and a background layer containing at least one object, the three layers being combined for display. No teaching or suggestion of the use of such layers as claimed is apparent in Katsurabayashi or in the prior art as a whole.

Claim 87 depends upon claim 86 and is believed to be further allowable because of the added limitations of the erasure methods for moderator and participants.

Claims 88 and 89 depend upon claims 87 and 86, respectively, and are believed to be further allowable because of the recited use of the method in electronic classroom instruction. It is respectfully submitted that the prior art does not fairly suggest such a classroom instruction method to a person of ordinary skill in the art. It should be noted that electronic classroom instruction may be limited to a single classroom or may involve multiple classrooms in a single building or in buildings at different geographical locations, as in distance learning, for example.

Double Patenting

The Examiner rejected claims 5 and 25 on grounds of alleged double patenting over claims 1 and 57, respectively, of Patent Application No. 09/899,431, now Patent No. 7,003,728.

"In determining whether a nonstatutory basis exists for a double patenting rejection, the first question to be asked is - does any claim in the application define an invention that is merely an obvious variation of an invention *claimed* in the patent?"[4] "When considering whether the invention defined in a claim of an application would have been an obvious variation of the invention *defined in the claim* of a patent, the disclosure of the patent may not be used as prior art."[5]

Claim 5 of the present application recites a server among other limitations which are not in claim 1 of the '431 application. The latter claim has no suggestion whatsoever of a server in the system as defined in that claim. It is respectfully submitted that the invention of present claim 5 is not an obvious variation of the invention defined in claim 1 of the '431 application.

Claim 25 of the present application has been amended to include additional limitations, as described above, which are believed not to be obvious in view of the cited *claim* of the '431 application.

It is respectfully submitted that the double patenting rejection should be withdrawn.

Miscellaneous Amendments

Miscellaneous amendments have also been made, for example, to correct the claim dependency in claim 51, or to clarify certain language or correct minor errors as will be apparent to the Examiner from reading the amended claims.

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[4] MPEP §804 (emphasis added).
[5] *Id.* (emphasis added).

Conclusion

In view of the foregoing remarks and amending changes, it is respectfully submitted that claims 1-89 now pending in the application are believed to be in condition for immediate allowance, and such action is respectfully requested. No new matter is introduced by this amendment.

The Examiner is invited to contact the undersigned attorney by telephone if a discussion of any issues concerning the application would help expedite the allowance of this application.

Respectfully submitted,

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